





PDP Instruction Manual for customers

 **Model 42V5**



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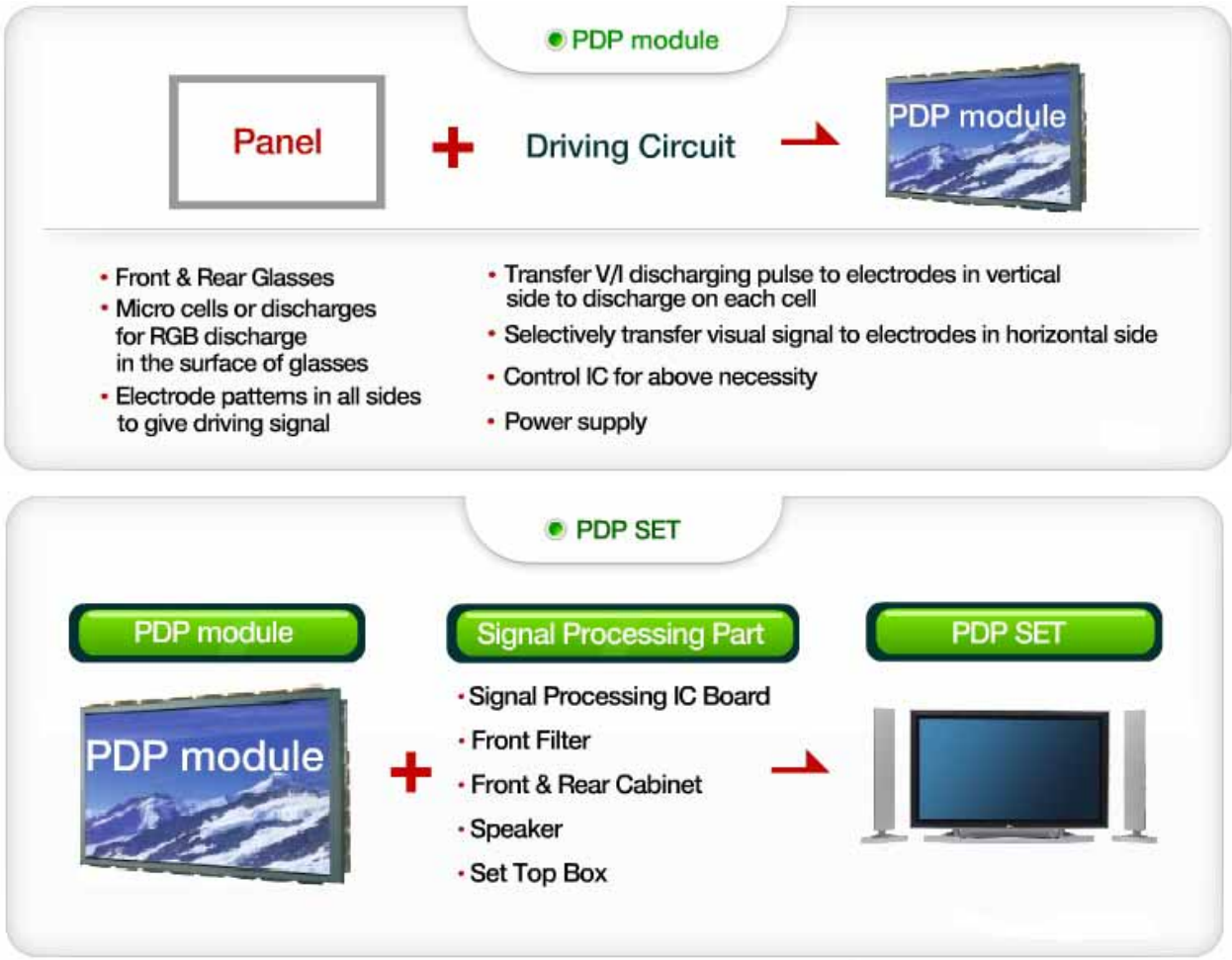
-  **INTRODUCTION**
 -  **PRECAUTIONS**
 -  **BASIC**
 -  **TROUBLE SHOOTING**
-

This manual is for the 42" V5 model.

Basic rules are same with 42" V5 for other models.

1.1 PDP module

PDP module is composed with PANEL part and DRIVE part. Panel is consist of electrode, phosphor, dielectric, gas. And drive part is made up of electronic circuit (X , Y-sus, Z sus, Y drv,PSU,CTRL B/D) and PCB.



1. Introduction

1.2 About 42V5 model



X means XGA resolution (1024 768) .
using dual scan method
V5 shows 1000:1 contrast ratio and 1000cd.
So V5 called as KK model.

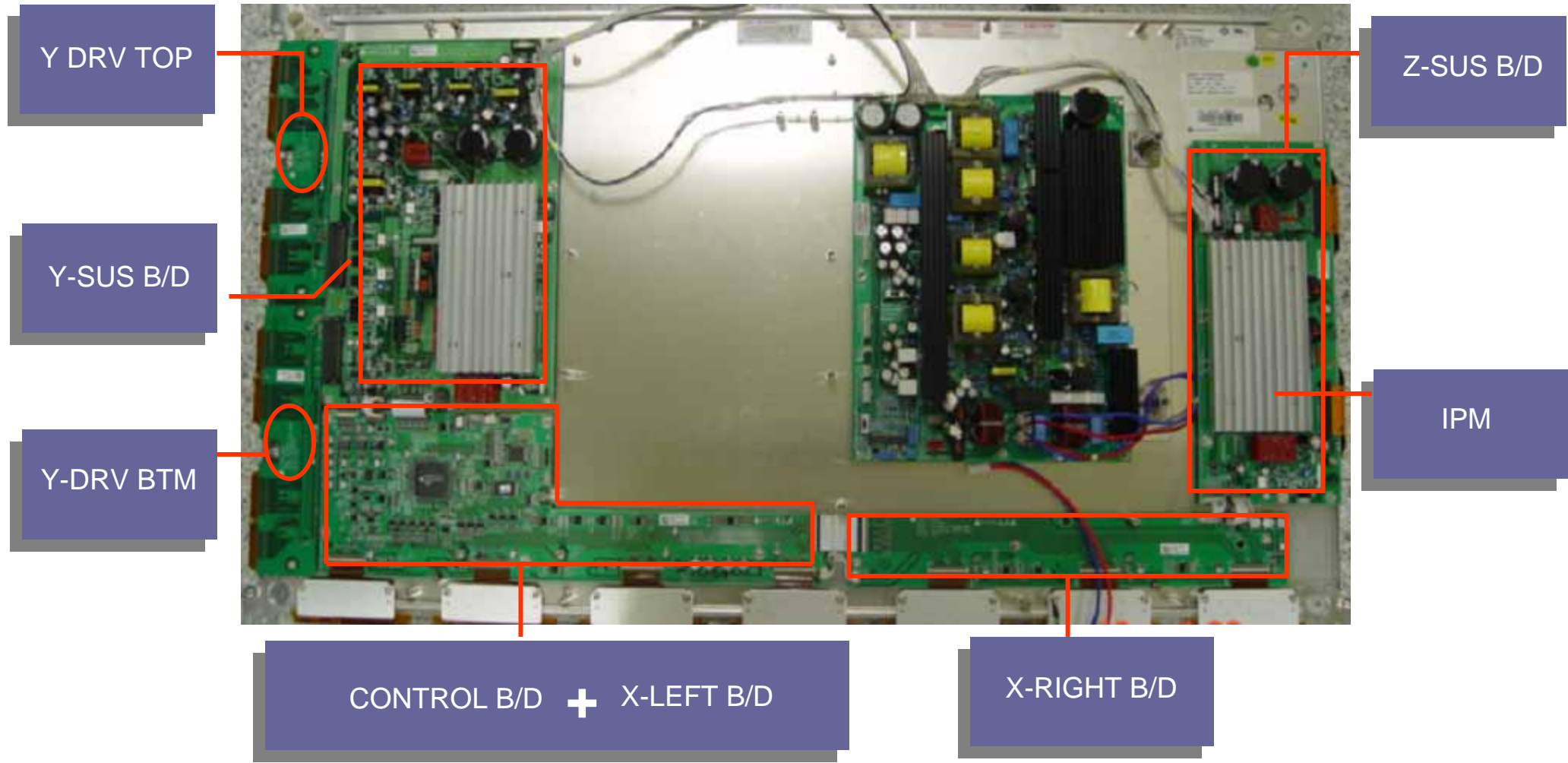
1.3 The purpose of this manual

1. We want to communicate harmoniously by educating a defect phenomenons and terms to send LG Electronics a message that includes a detail articles of defect panel.
2. Let customers can distinguish module defect(LG Electronics defect) and a defect from their work by educating an early analysis for SET maker .So customers can decide easily whether it is LG defect or customer's.
3. Prevent defects which is made during set assembly process previously by educating Work precautions and conditions.

Since mixed terms may cause confusion. Please use the formal terms which in this manual.

1. Introduction

42 inch V5 MODEL.

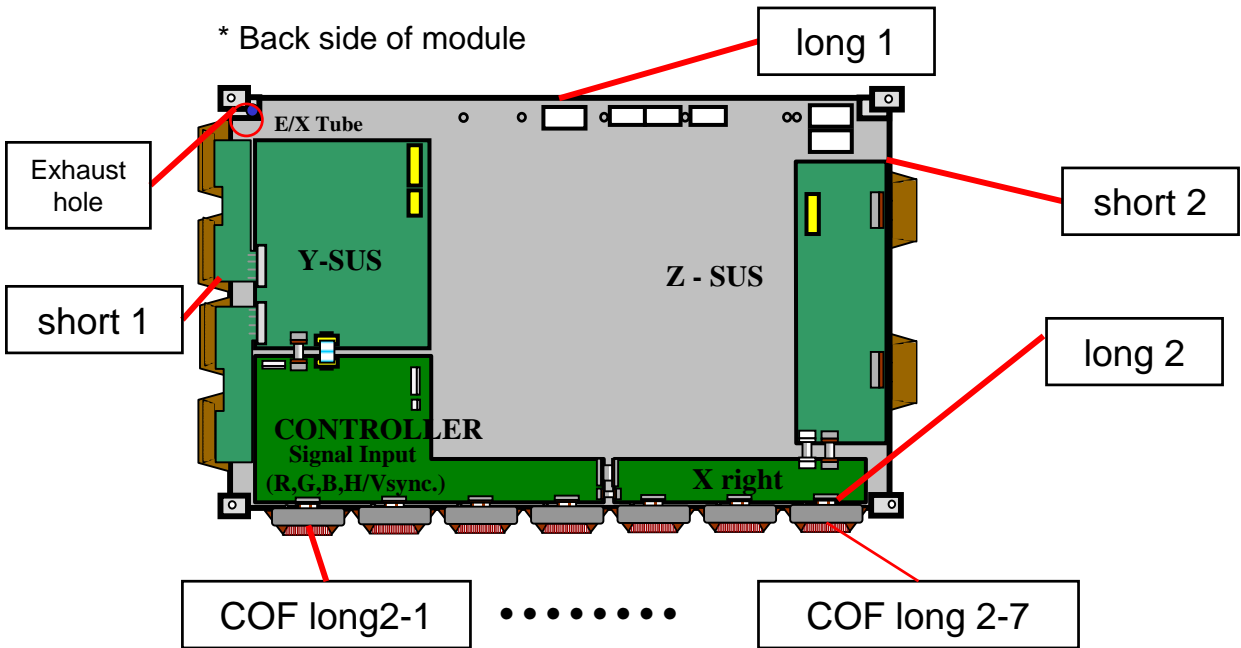


1. Introduction

1.4 Definitions

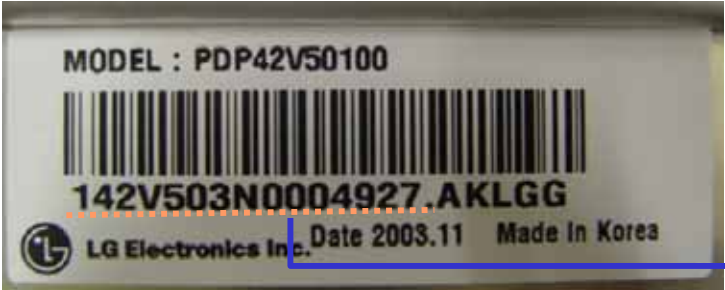
Definition of MODULE position

* Back side of module



PDP Module S/N

When you request LG to repair PDP module, Please inform LG the Module S/N for tracking the module's history by e-system

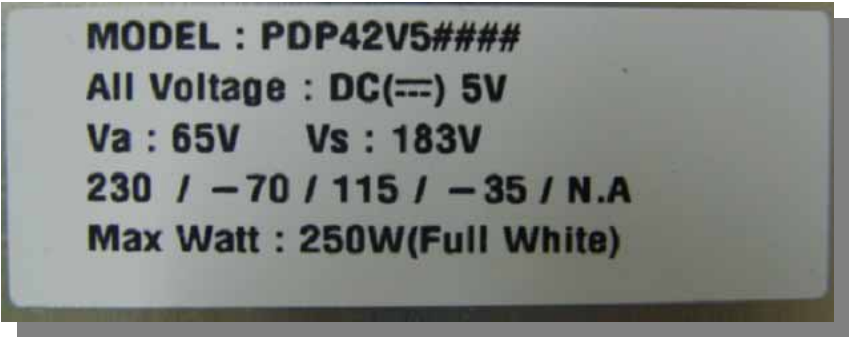


Module SERIAL NO.

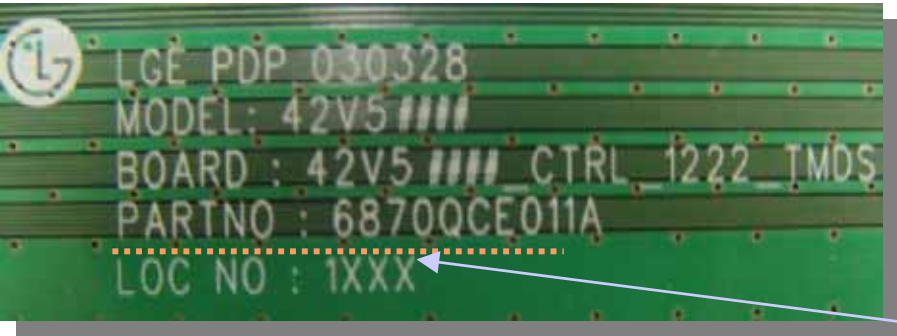
- Model Name
- Bar Code (Code 128, Contains the manufacture No.)
- Manufacture No.
- The trade name of LG Electronics
- Manufactured date (Year & Month)
- The place Origin
- Model Suffix

1. Introduction

Voltage label (Attached on back side of module)



Part No. label (Attached on board)



BOARD ASS'Y
PART NO.

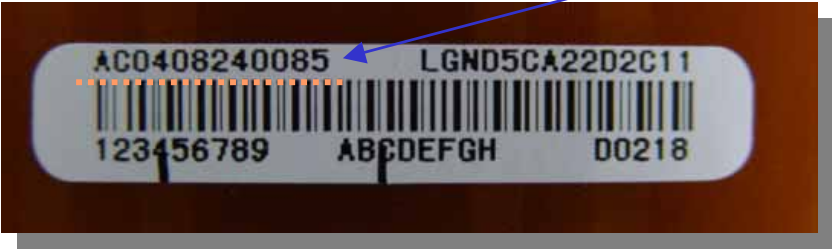
BOARD NAME

BOARD SERIAL NO.

PCB PART NO.

COF serial No. label (attached on COF)

COF SERIAL NO.



1. Introduction

Terms of defect



Add short (light on)



Add open (light off)



Sus short (light on)



Sus open (light off)



Add bar (light off)



Mal discharge



Cell defect



Add short (light on)

2. Precaution

2.1 Safety precautions

Be sure to read this before repair. When using/ handling this PDP module, Please pay attention to the below warning and cautions.

1. Before repairing there must be a preparation for 10 min.
2. Be aware of metallic particles to prevent short circuit .
3. Do not impress a voltage that higher than represented on the product.
4. Since PDP module uses high voltages, Be careful a **electric shock** and after removing power some current remains in drive circuit.
so you can touch circuit after **1 min**.
5. Drive circuits must be protected from static electricity.
6. The PDP module must be Moved by two man.
7. Be careful with short circuit of PDP boards when measuring any voltages.

2.2 Before service request

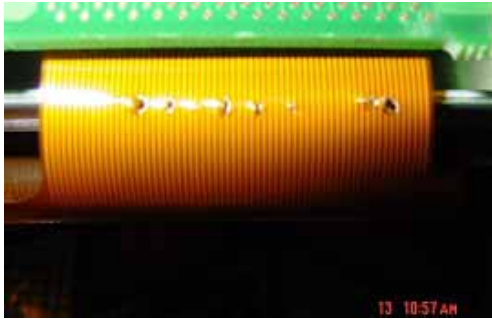
1. Check panel surface and appearance of B/D.
 2. Check the model label. Whether it is boards of same model with label.
 3. Before requesting Service, please inform us a detail defect phenomenon and history of module document.
it can be helpful to us for a smooth service.
- Ex) COF long 2-1 fail ,address 1 line open, Y b/d problem , mis-discharge.

2. Precaution

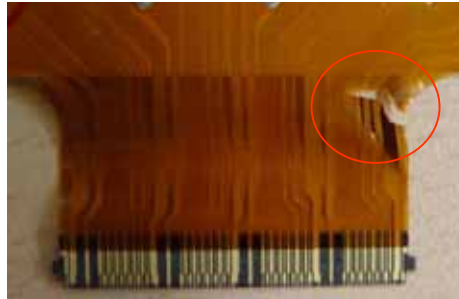
2.3 Handle with care (COF)

COF is the most important component in the PDP module.

Even a little imperfection of COF can make a serious screen problem.



SCRATCHING

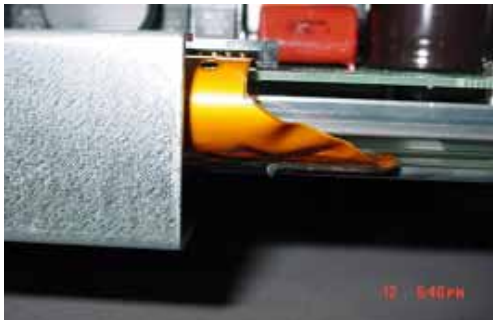


TEARING

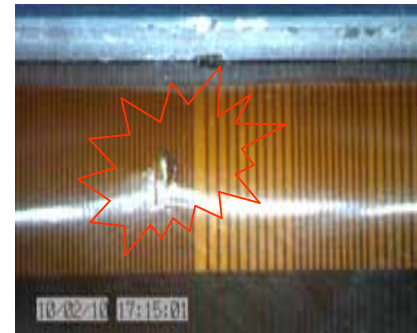


BEING PUSHED

These must not happen in assembly process



BENDING



CHOPING

3. Basic

1. X B/D

: X board have two kind of funtion one is an addressing and another is a path. It receives LOGIC signal from CONTROL B/D and make ADDRESS PULSE(generates Address discharge)by ON/OFF operation of FET , and supplies this waveform to COF(data) as a path.

X LEFT B/D



Signal part

X RIGHT B/D



Power part

2. Z sustain B/D

: make SUSTAIN PULSE and ERASE PULSE that generates SUSTAIN discharge in panel by receiving LOGIC signal from CONTROL B/D.

this waveform is supplied to panel through FPC(Z).

*composed with IPM,FET,DIODE, electrolytic capacitor ,E/R coil.

* IPM (Intelligent Power Module)

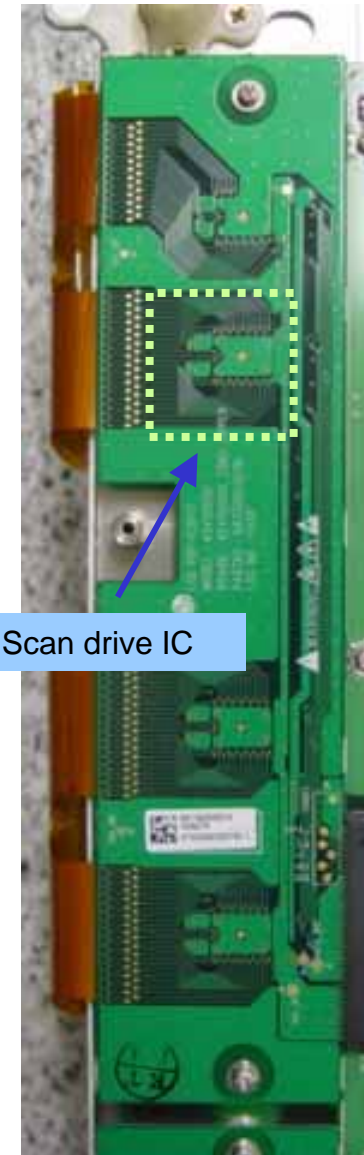
E/R(Energy recovery)



3. Y drive B/D

- 1) This is a path to supply SUSTAIN ,RESET waveform which made from Y SUSTAIN B/D to panel through SCAN DRIVER IC.
- 2) Supply a wave form that select Horizontal electrode (Y SUSTAIN electrode) sequentially.
 - potential difference is 0V between GND and Vpp of DRIVER IC in SUSTAIN period.
 - being generated potential difference between GND and Vpp only in SCAN period.

* In case of 42" X1 use DRIVER IC IC 12 EA (TOP, BOTTOM: each 6EA)



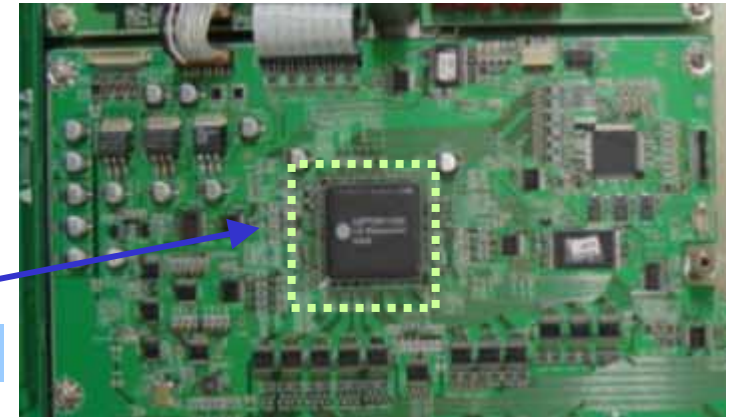
3. Basic

4. Y sustain B/D

- : generates SUSTAIN,RESET waveform, $V_{sc}(\text{SCAN})$ voltage.
and supplies it Y DRIVER B/D.
- * Composed with IPM,DIODE, electrolytic capacitor ,FET.

5. Control (logic) Board

- : creates signal processing (Contour noise,reduction ISM,..)
and an order of many FET on/off of each DRIVER B/D with
R,G,B each 8bit input.
- * Use 3.3V/5V 2 kinds of power .



MCM(Multi Chip Module)

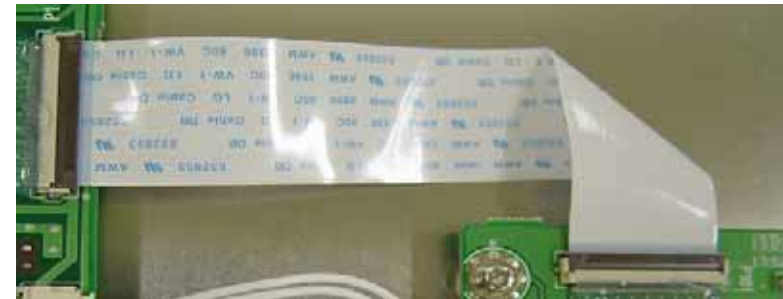
6. FPC (Flexible Printed Circuit)

- : supply a driving waveform to PANEL by connecting a PAD electrode of PANEL with PCB(Y and Z).
- * there is two type of this for Y B/D. One is single-sided, another is double-side. These are having pattern on it
- * for Z B/D, there is no pattern , single-sided, and Beta type(all of copper surface).



7. FFC (Flat Flexible Cable)

- : for connecting a Logic signal between B/D and B/D.
- *There is 0.5mm pitch,50pin type
- 1mm pitch ,30pin type.



8. COF (Chip On Film)

: supply a waveform which made from X B/D to panel and select a output pin that is controlled by COF when be on or off.

96 output pin per IC.

the more the resolution higher, the less spare space where can set IC on it in B/D. without using IC PACKAGE, we use a BARE IC , so we can get IC with LOW COST because we do not solder IC on PCB directly, a soldering defect rate decrease.

* composition

1) FPC + Heat /Sink

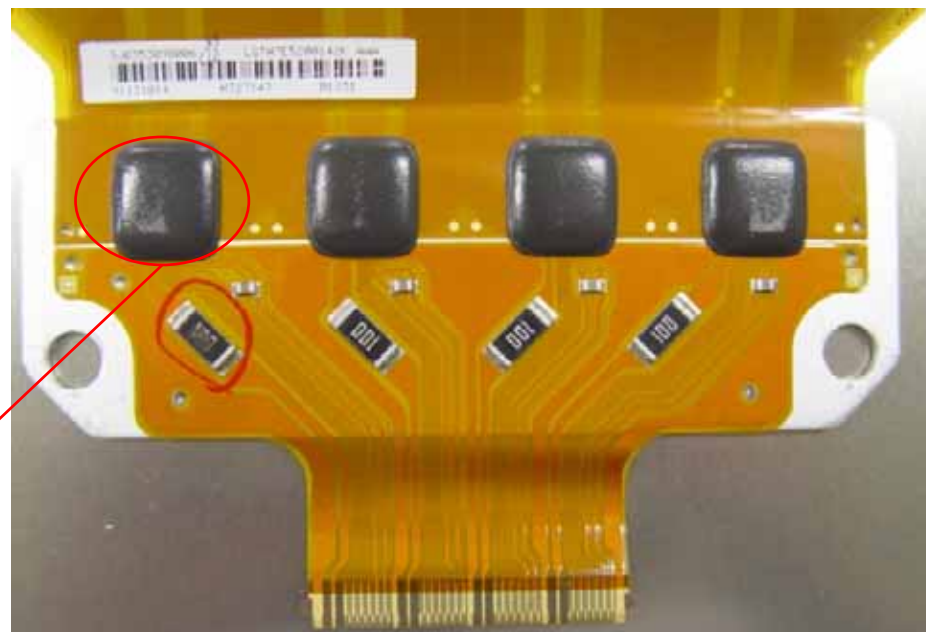
⇒ FPC for COF must have a Low Spec decline with getting damp

2) CHIP resistor + CHIP CAPACITOR

3) BARE IC (STV7610A/WAF) + GOLD WIRE/AL WIRE

4) EPOXY MOLDING

Bare IC



* 42 V6 COF is the same as 42V5.

9. IPM(Intelligent Power Module)

: composition

HEATSINK,CAPACITOR

DIODE

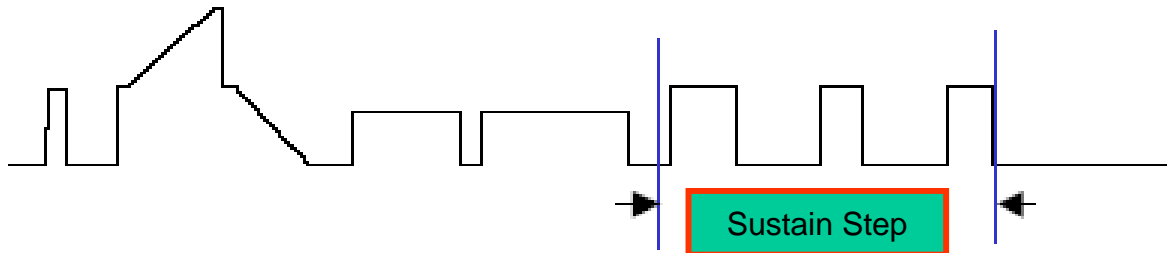
IC LINEAR

RESISTOR, TRANSISTOR, FETS.

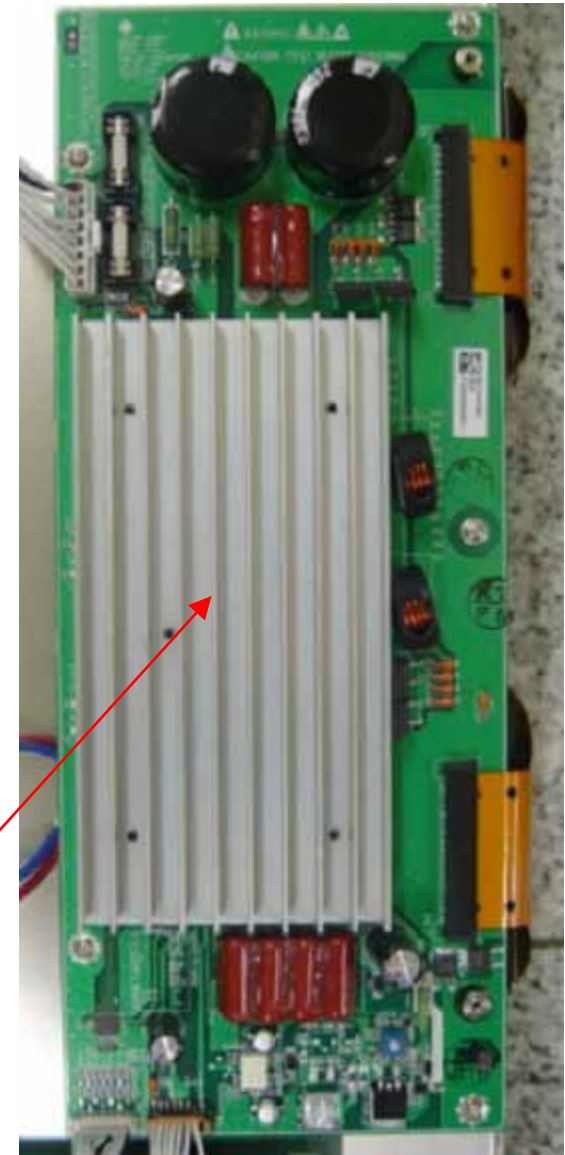
: description

Attached at Z B/D and Y B/D, make Sustain waveform.

Sustainer : supply a square wave to panel to make a video.



IPM



4. Trouble shooting.

Fast check up

defect

Check model No. of module , all connectors and cables.

No display?

Y

Check panel appearance → Check all FUSE. → Check PSU output (Va,Vs,5v).
(Include exhausting tip, GLASS crack)

N

Check Y, Z b/d input voltage → Replace ctrl b/d → Replace Y, Z b/d

vertical defect?

Y

Check panel appearance → Check COF → Replace X b/d → Replace ctrl b/d

N

Horizontal defect?

Y

Check FPC → Replace Y drv b/d → Replace Y sus b/d → Replace ctrl b/d

N

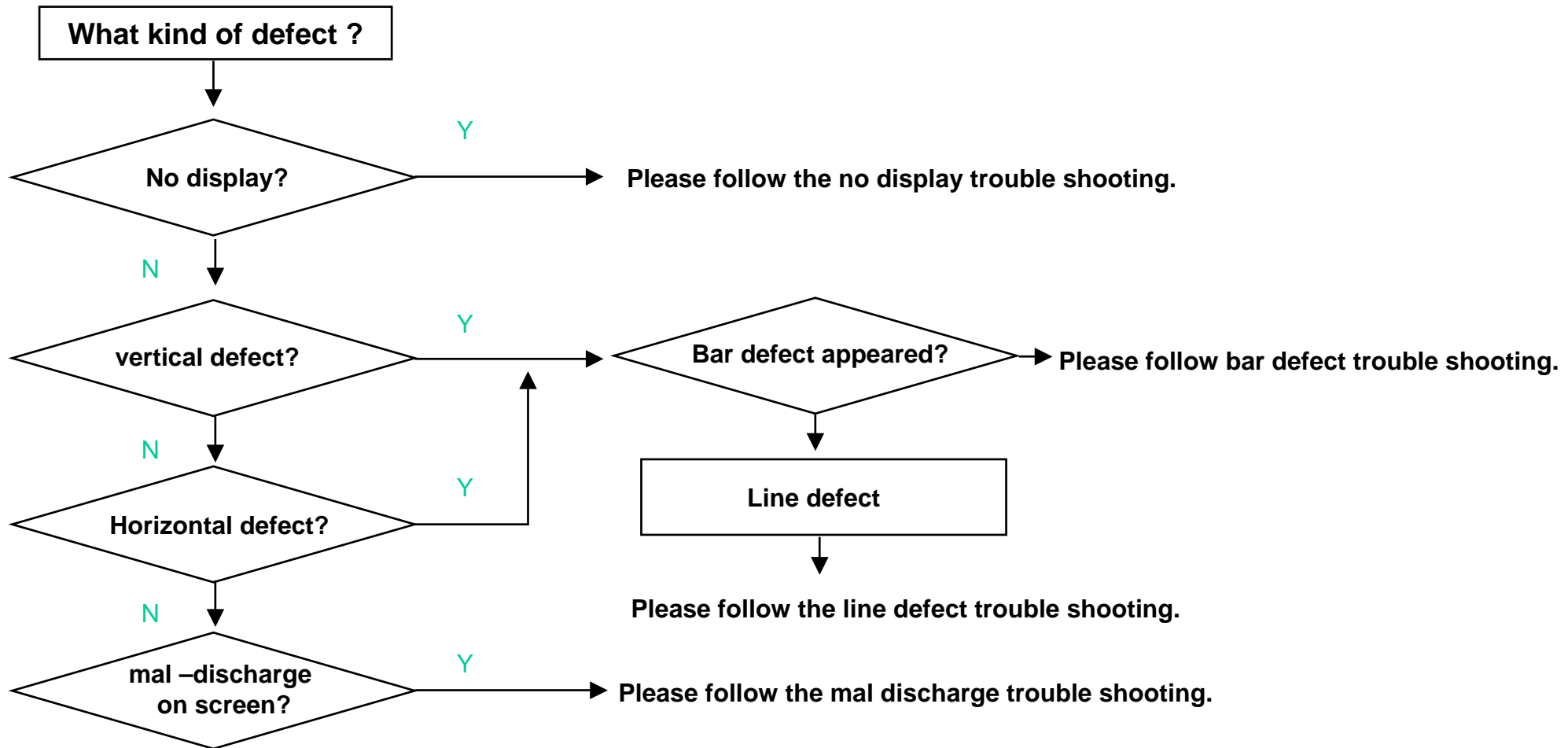
Mal -discharge
on screen?

Y

Replace Y drv b/d → Replace Y sus b/d → Replace ctrl b/d

4. Trouble shooting.

Logical judgment



4. Trouble shooting.

No display

Check each section with following method if there is problem, replace or repair that part.

If not go to the next section.

1. Connector

Confirm every Connector (PSU, Y-SUS, CTRL, Z-SUS)

module may not be normal by mis-connection which can not send signal and power.

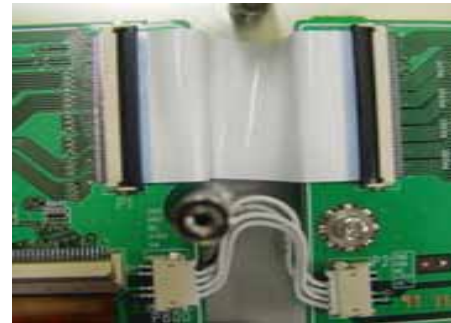
Also Mis connection for a long time has a specific b/d failed.



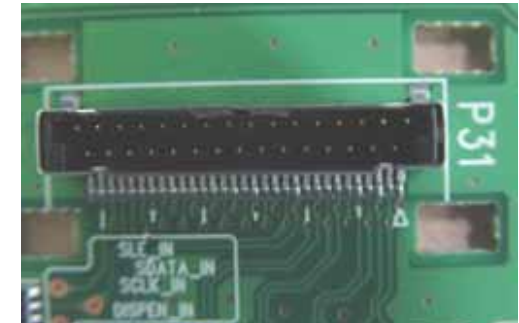
CTRL B/D + Y-SUS



CTRL B/D + Z-SUS



X-B/D + X-B/D



Signal input(LVDS)

4. Trouble shooting.

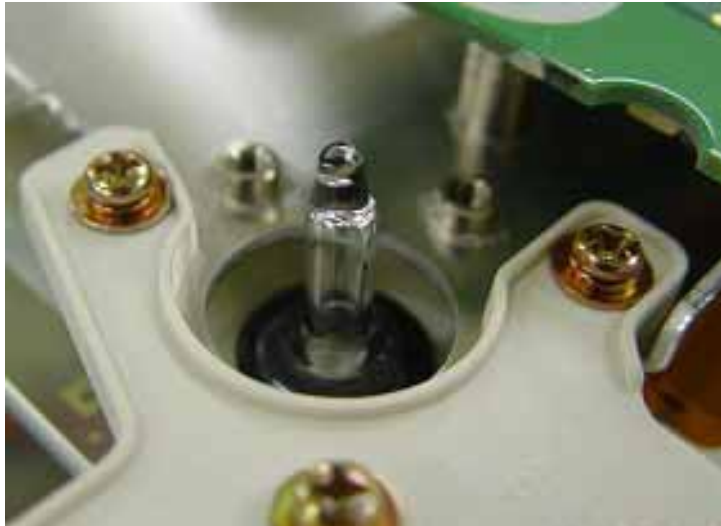
2. Exhaust tip Crack

Confirm exhausting Tip and find Crack with eyes to check the vacuum state of panel.

If there is problem replace the module .

in case of vacuum breakdown, module makes a shaking noise because of inside gas ventilation.

(there may be a small crack which could not see with naked eyes. And this noise is different from Capacitor noise.)



NORMAL



CRACKED

4. Trouble shooting.

3. PSU(Power Supply Unit)

1. Check each unit part of PSU inside with naked eyes.
(capacitor, FET, a kind of IC, resistor)
2. Check SW on Normal.
3. Check Output voltage which is converted from AC V to DC V.

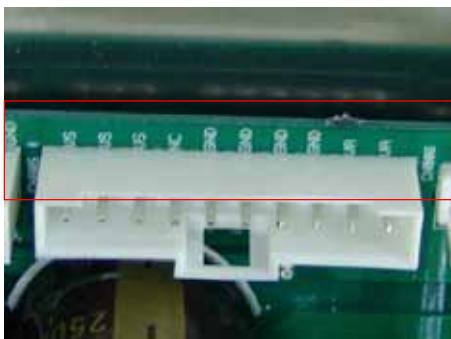
voltage Check (5V, Va, Vs)

When PSU Protection occurred. Check Short between Y-SUS, Z-SUS B/D .

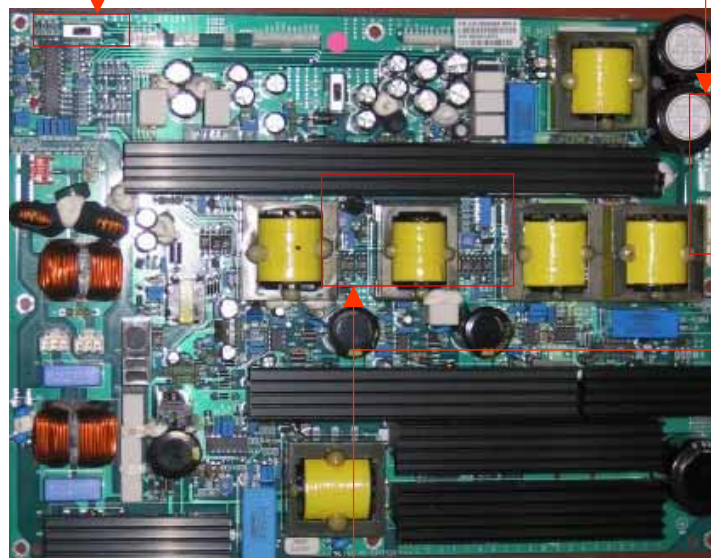
Confirm
input voltage

if not same

Adjust
voltages



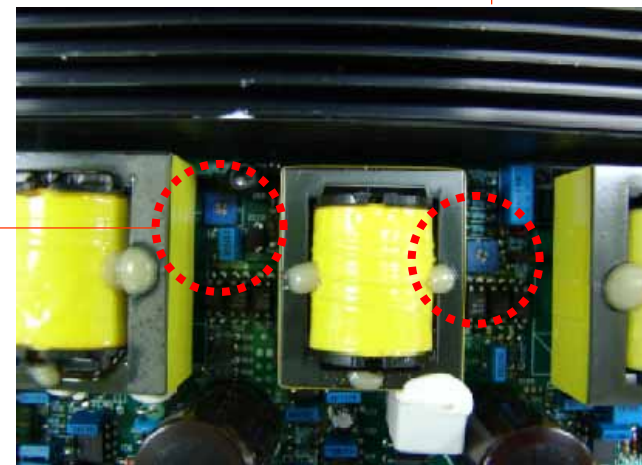
Multi-meter Touch point
(5V, Va ,Vs must accord with Module Label)



SW Normal

Vs Voltage ADJ
(Vs : About 180 ~195 V)

Va Voltage ADJ
Va : About 55 ~65 V



4. Trouble shooting.

4. Ctrl B/D

1. Confirm LED D17(flashing) ,13 lighting
2. If not CHECK OSC X1 output.
3. Check CTRL input voltage.

4. CHECK 3.3V, 5V.

5. Check IC 404 3.3V

IC 54 2.5V

OSC(X2)

Probe
Touching
point



Check oscillating state.

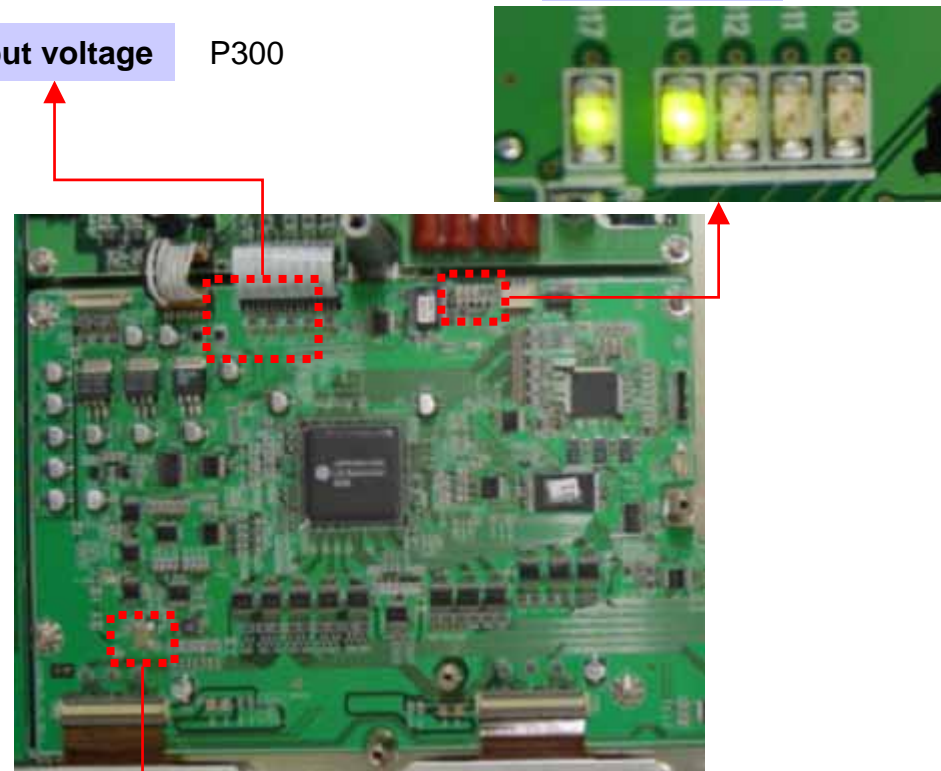
(normal 100 MHZ)

Be careful with physical shock.

Input voltage

P300

Diode



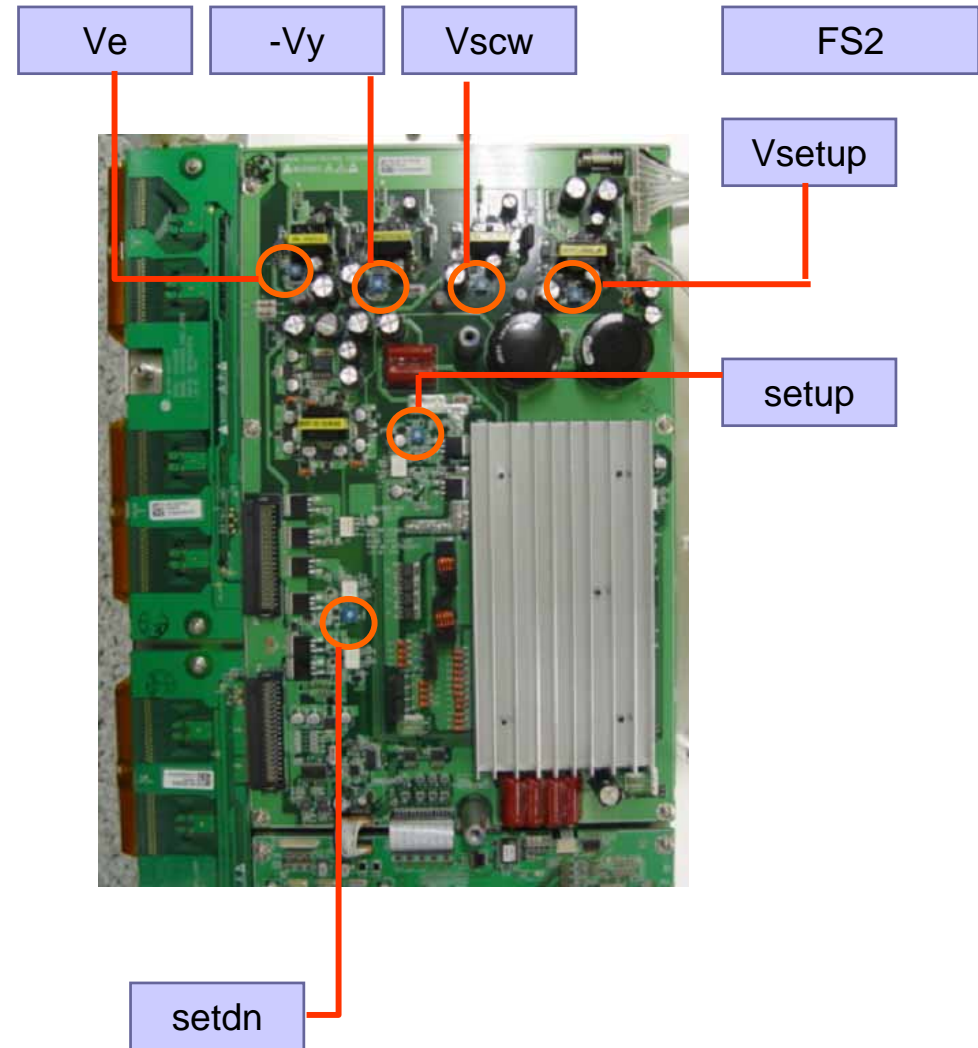
4. Trouble shooting.

5. Y-sus B/D

1. Check FUSE [FS2(Va) ,FS3(Vs)].
2. Check voltages(Vsetup,-Vy, Vscw)
3. Check DIODE between GND and Y SUS output.
[SUSUP(OC2) SUSDN(OC1)].
forward=0.4 ,reverse=OVERLOAD.
4. Check whether output voltages agrees
with voltage that represented in label.



F2(Vs) FUSE 6.3A



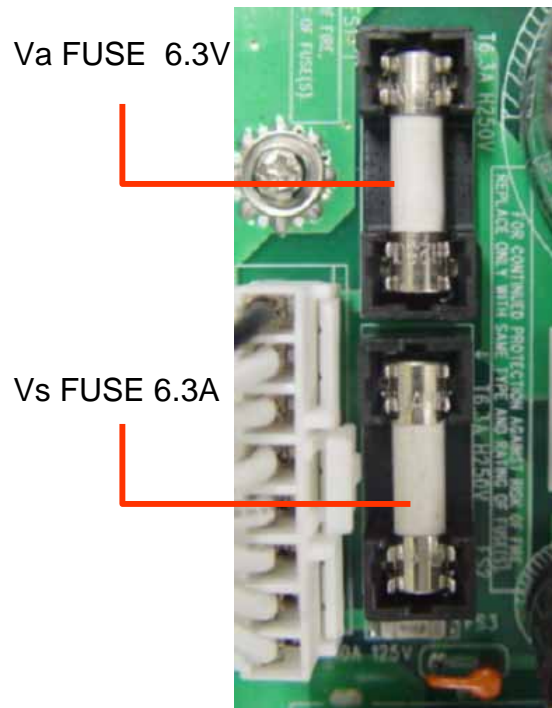
Check whether output voltages agrees with voltage that represented in label.

4. Trouble shooting.

6. Z-sus B/D

1. Check the FUSE.
2. Check input voltages.(Va, 5V,Vs)
3. Check FPC out put diode value.
4. Check ramp waveform.

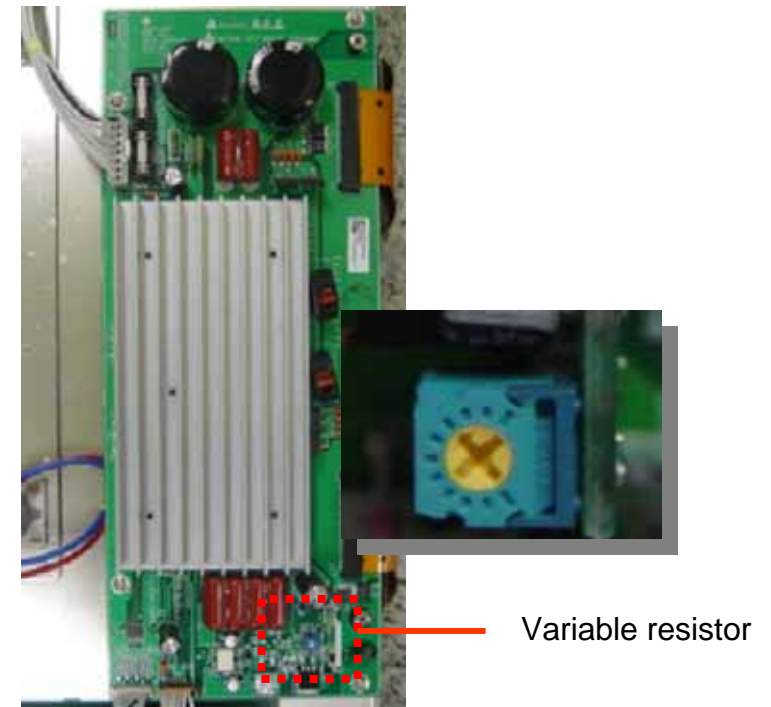
Check the FUSE



Check input voltages

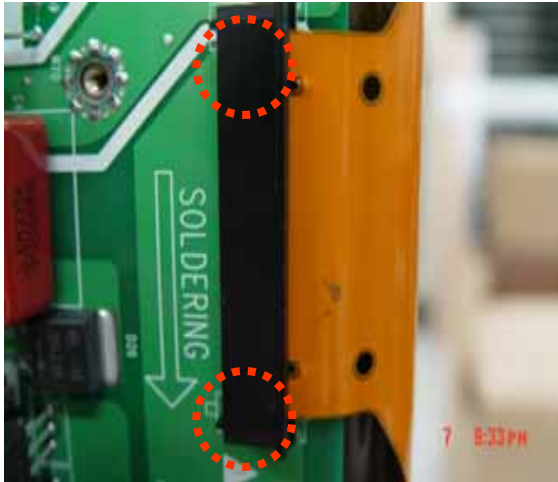


Variable resistor of Z RAMP waveform slope.

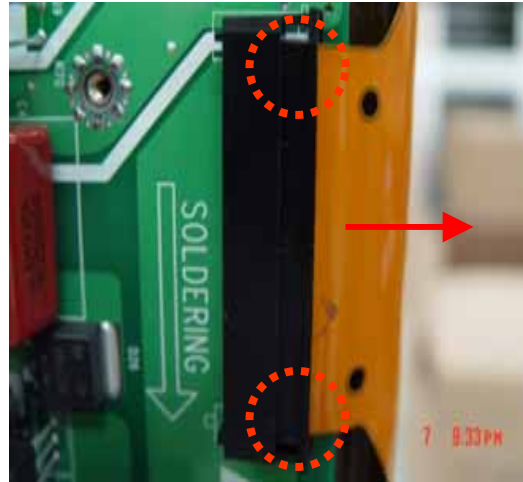


4. Trouble shooting.

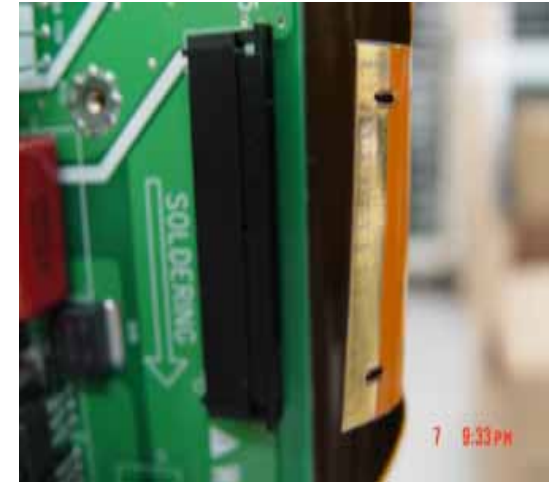
<FPC Separating>



Separate the fixed Screw of Z-Board.
Pull out Lock as shown in arrow.



Condition in Lock part is pulled



Pull FPC Connector
as shown in arrow.

4. Trouble shooting.

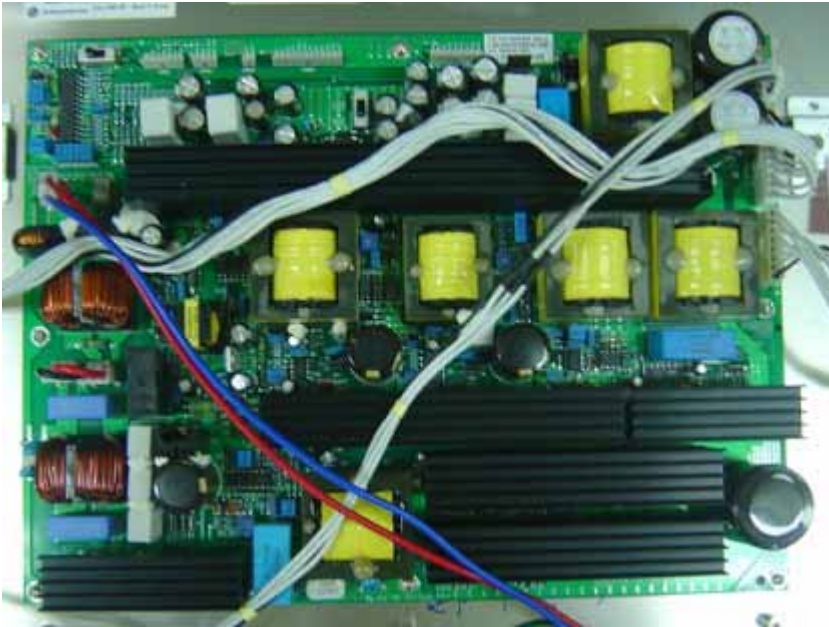
Power protection

It is power protection when power is off automatically within 2~3 min. from power on.

Power protection function protect the boards when occurred short on circuits of PDP module or power problem.

If can not impress power even after replacing PSU, find out where the short occurred.

*** PSU makers.**



DAEGIL PSU
(diode on board)



ORIGIN PSU
(No diode)

4. Trouble shooting.

Vertical defect (bar)

Check each section with following method if there is problem, replace or repair that part.

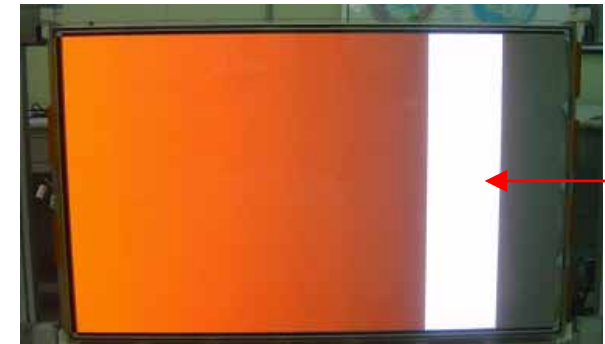
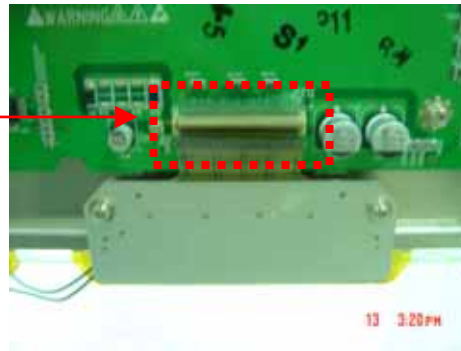
If not go to the next section.

1. Connector

Check COF connector.

If not connected well, it will Make a bar defect .

Check here



Bar

Check here



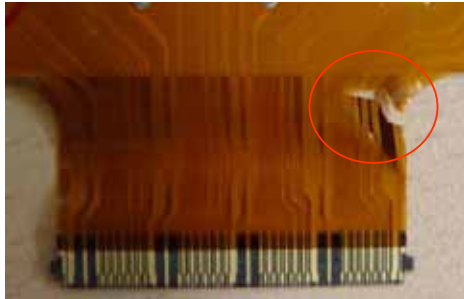
Off

4. Trouble shooting.

2. Checking COF

Confirm whether COF was torn. And then check input of COF resistor and IC.

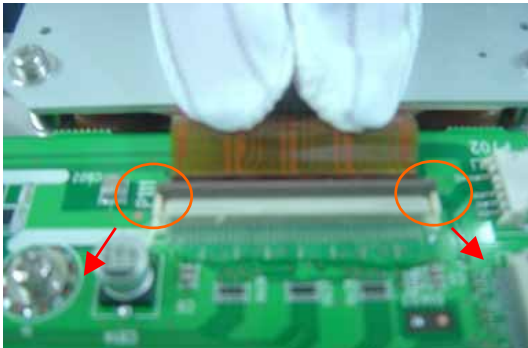
Tearing →



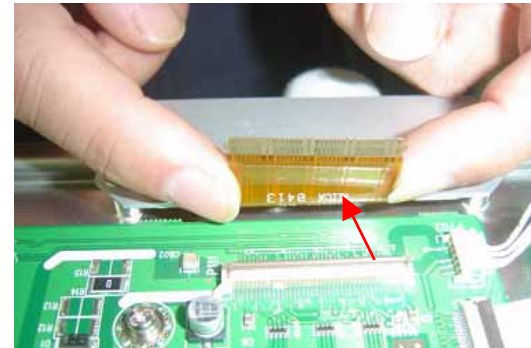
COF 6 is torn partly



<COF Separating>



Lift up lock as shown
in narrow.



Pull COF
as shown in narrow.

4. Trouble shooting.

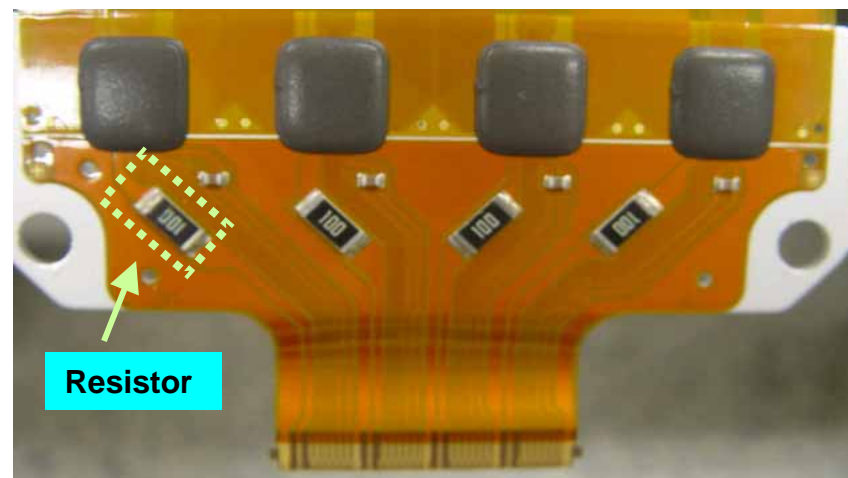
Checking address COF input of resistor and IC

COF resistor checking

Check the both side of resistor With Digital multi meter(DMM) .

If the resistor is normal, the resistor value will be 10.2 ~ 10.8

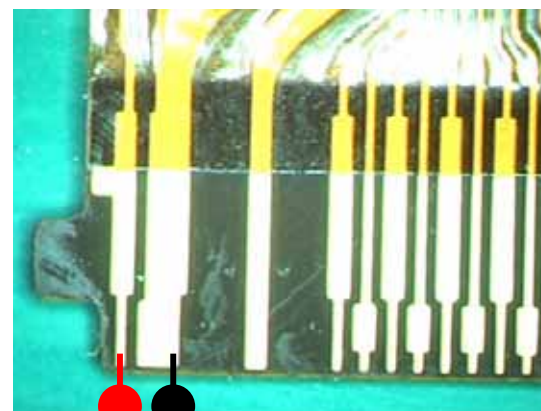
But if not, the value will be 0 or infinity and replace the resistor.



COF short circuit check

Check the short circuit between Va and GND short.

If it is short, cof is failed.



Va

GND

4. Trouble shooting.

Checking address COF input of resistor and IC

IC input checking

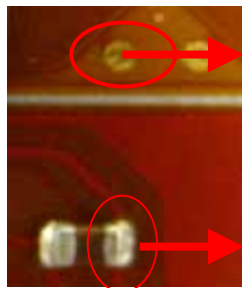
Inside of IC , there is 4 ea diodes which separated in 2 series .

(input 2, output 2)

how to check

- 1.contact DMM + terminal to a right terminal of condenser(GND)
and DMM - terminal to a right terminal of IC, normal value is **0.68** (fig.1)
- 2.contact DMM - terminal to Output terminal of resistor, and
DMM + terminal to a right terminal of IC , normal value is **0.745** (fig.2)

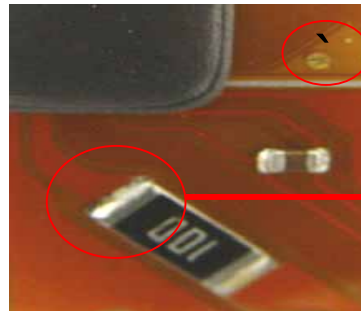
Fig. 1



DMM(- terminal)

DMM(+ terminal)

Fig. 2



DMM (+ terminal)

DMM (- terminal)



Confirm this position.

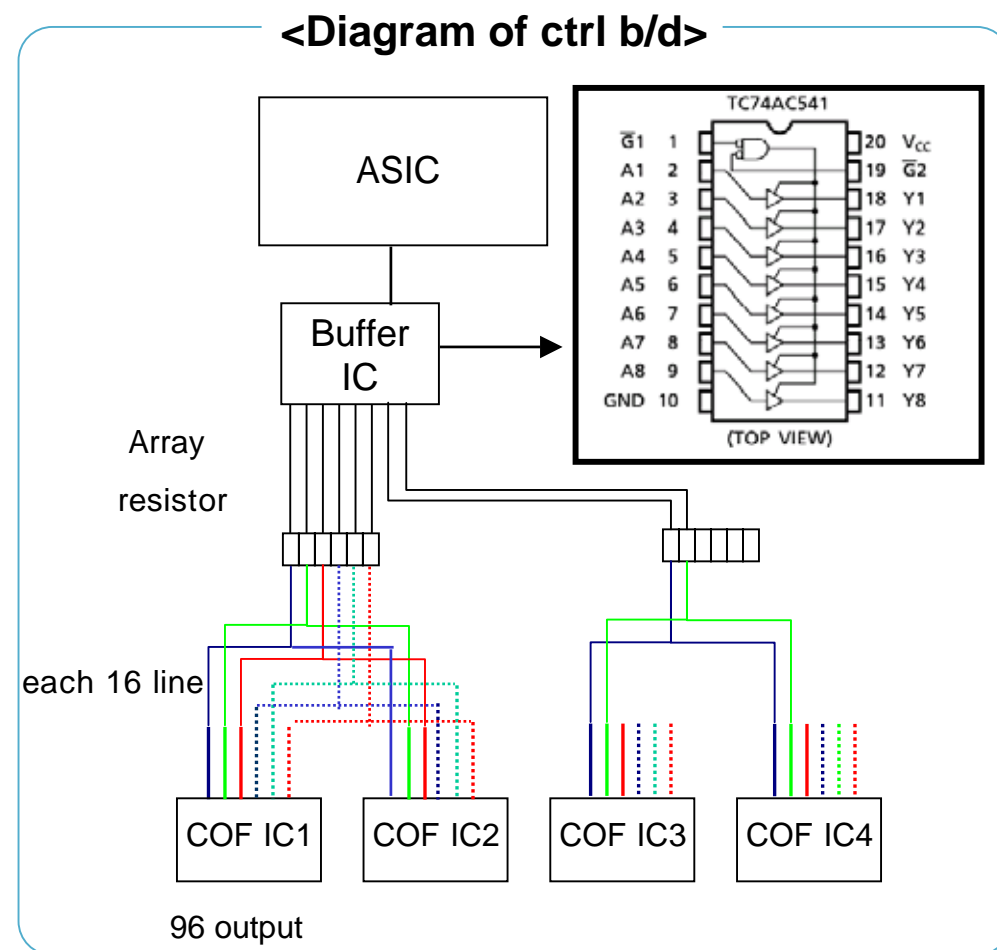
4. Trouble shooting.

3. Ctrl B/D

CTRL B/D supplies video signal to COF. So if there is a bar defect on screen, It may be the ctrl b/d problem.

A flow of address signal

In this figure, we can easily suppose what will be appeared on screen when a specific part failed.



4. Trouble shooting.

Vertical defect (line)

In case of 1 line open or short , check foreign substances in COF connector.

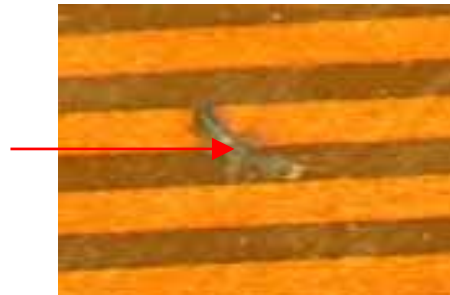
First blow up the connector with your mouth to remove foreign substances which may be on it. And then if the same line appears, replace the panel.

1 line open or short

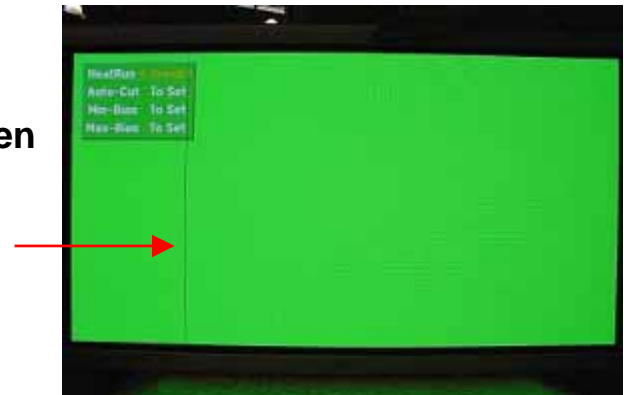
This phenomenon is due to COF IC inside short or adherence part of the Film and rear panel electrode problem.

In this case, replace the panel.

1 electrode open

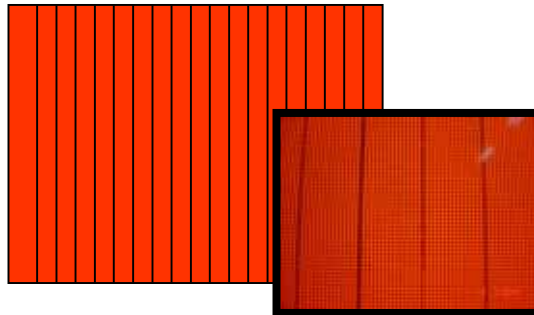


1 line open



Line open or short with same distance.

This is an MCM of Ctrl b/d defect. MCM can not be replaced separately. So replace the ctrl b/d.



MCM (Multi Chip Module)



4. Trouble shooting.

line defect from each parts

- **Case 1: Buffer IC fail**

COF IC 1,2 192 line(96+96) open.

COF IC 3,4 64 (16 4)line open

(with fixed interval there is on,off Repetition)

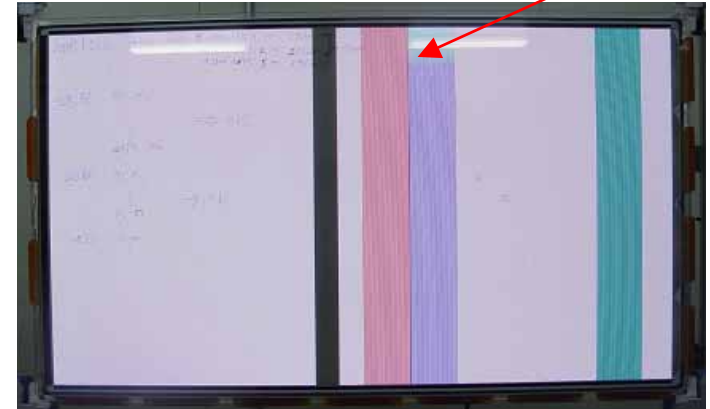
- **case 2 : Array resistor fail**

COF IC1 16 line , COF IC2 16 line open

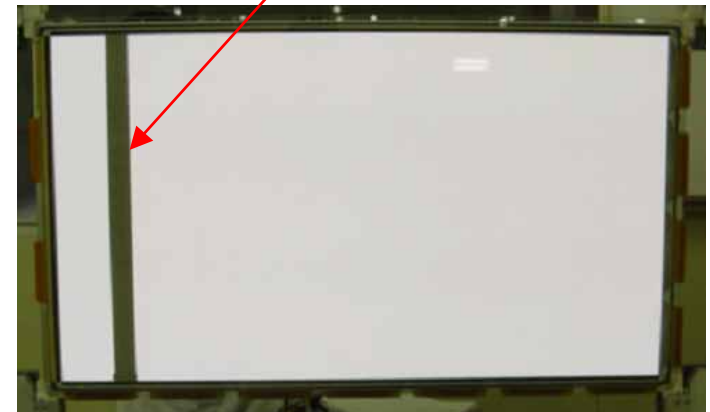
- **case3 : COF IC fail**

96 line open.

16 line open



96 line open



4. Trouble shooting.

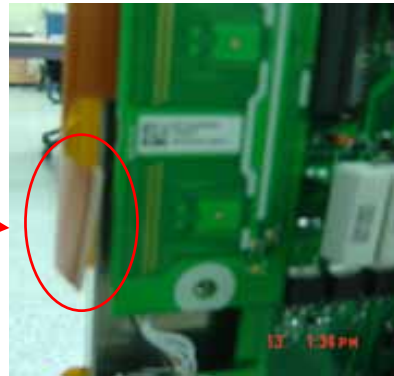
Horizontal (bar)

Most horizontal defects can be repaired. In case of adherence part of the Film and rear panel electrode defect or panel electrode open, short, replace the panel.

1. Connector

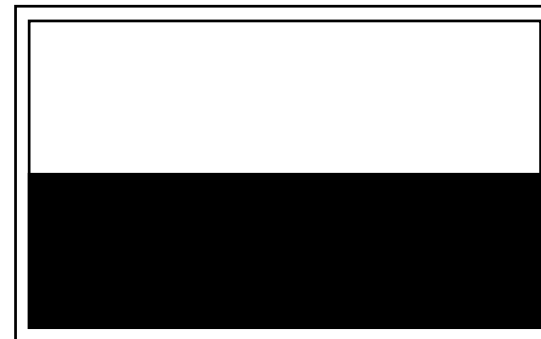
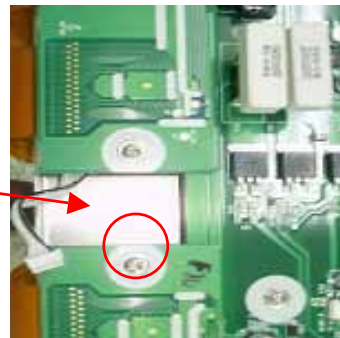
It can make a horizontal bar that connector on Y b/d and Z b/d did not plugged well. Because sustain voltage can not be supplied to panel. So check connectors (FPC, Y drv –Y drv) first.

Disconnected



Horizontal bar

Disconnected



Screen off

4. Trouble shooting.

2. Scan IC check

Check diode value of the right side part of output pin.

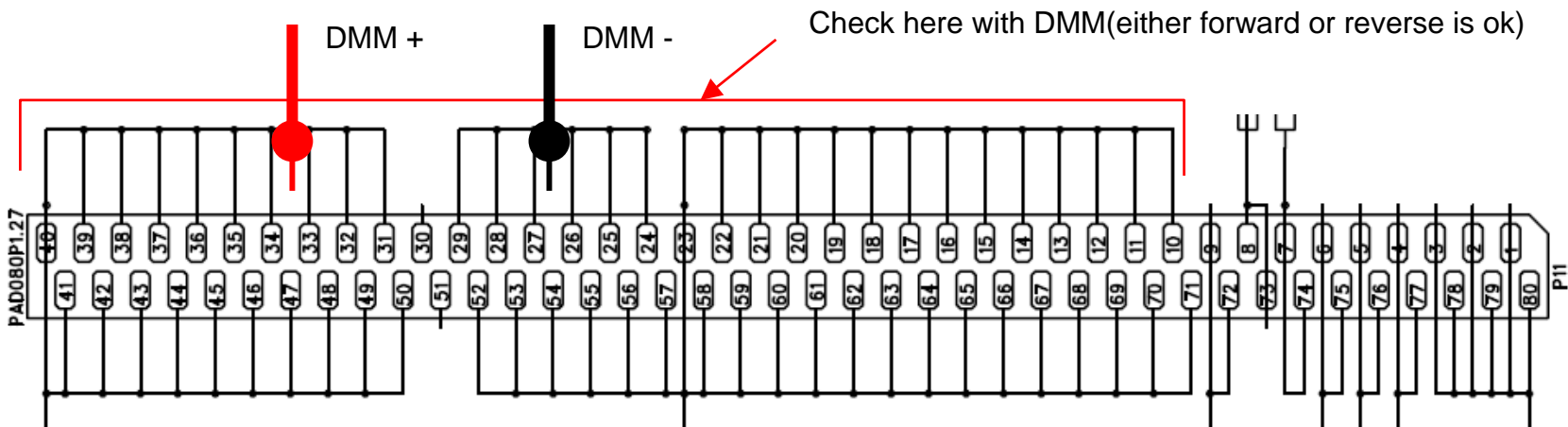


Normal diode value. (in case of TI IC =0.6 ~ 0.7)

* It can be different from each IC Maker.



Defect diode value= 0.018



4. Trouble shooting.

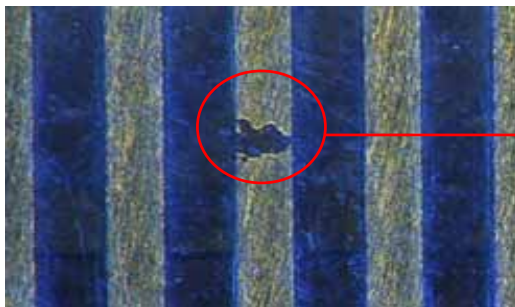
Horizontal (line)

1. Check FPC

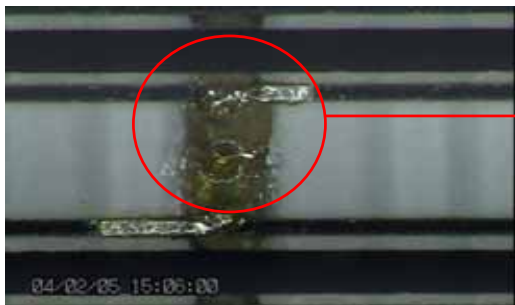
In case of horizontal 1 or more line, it is due to FPC or panel inside .ctrl b/d, Y b/d is just normal.

First , sweep the FPC electrode with a clean cloth or blow up the electrode to remove particles.

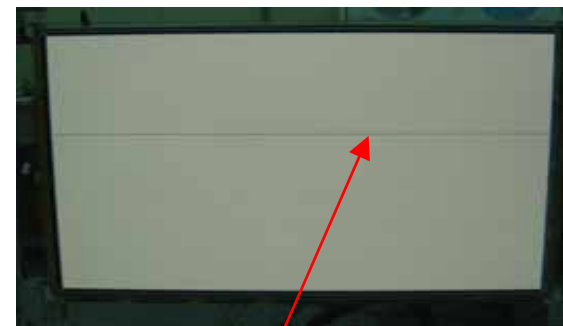
And then check the FPC and panel with your eyes.



FPC electrode open



Panel electrode
Insulation break down



Horizontal 1 line.

2. Check scan IC

Check with a same way that presented in Horizontal (bar).

4. Trouble shooting.

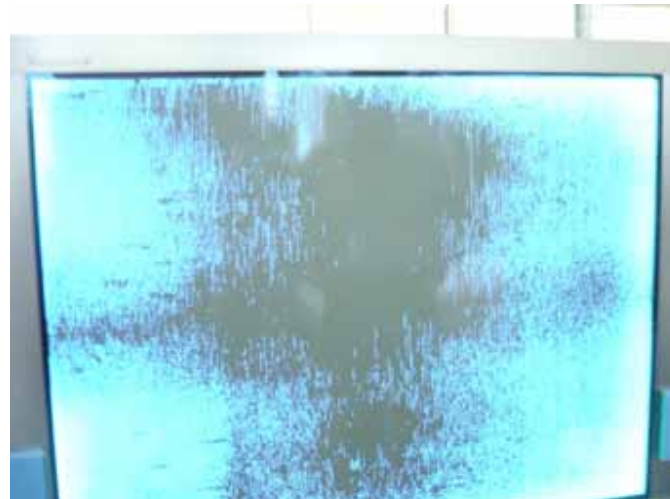
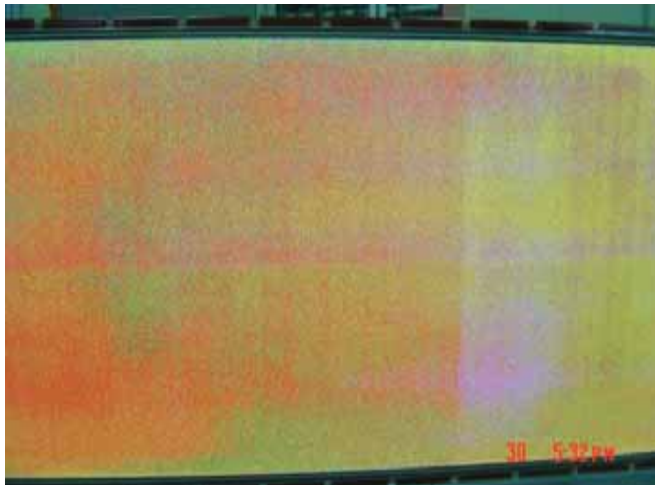
Mal-discharge

Most of mal-discharge appearance is problem of y drv ,y ,z b/d.check these boards when occurred.

Checking order

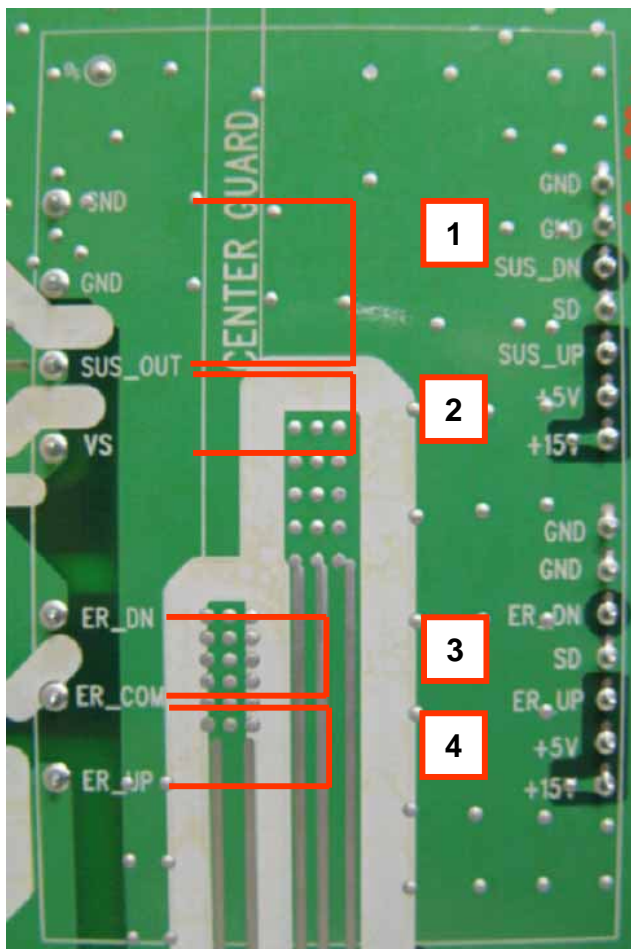
1. Confirm Y, Z SUS signal cable.
2. Check Y DRV IC FAIL
3. Check Y sus b/d voltages(-Vy.Vscw)
4. Check Y ,Z-SUS IPM fail
5. Replace CTRL b/d

***Mal-discharge**



4. Trouble shooting.

How to check IPM



Forward : **test 1** : GND(+) , Sus-out(-)
2 : Sus-out(+),Vs(-)
3 : ER-DN(-),ER-COM(+)
4 : ER-COM(-),ER-UP(+)

when each 4 TEST Diode value is over 0.4V => **OK**

Reverse : **test 1** : GND(-) , Sus-out(+)
2 : Sus-out(-),Vs(+)
3 : ER-DN(+),ER-COM(-)
4 : ER-COM(+),ER-UP(-)

when each 4 nodes TEST Diode value is infinity => **OK**

Specially, the value of ER-UP,COM,DN in the Y/Z board, should be checked all of them. but, the terminal of Vs,Sus-out,GND, we just check one of IPM because it is parallel.

→ if no problems, check 15V(Y,Z B/D) with GND, → Forward value 0.3V, Reverse value infinite. If no problems,

Attached #1.

Global Quality Information (GQI)

#SAMPLE

Set Model	MP-DP4220LV	Quantity	1	No. : TT-2004-DP4220LV-001		
Set Serial No.	PT420200099	Symptom	Vertical Line (R , G , B Pattern) Horizontal Line (R , G , B) No Raster Cell Defect Mal-discharge		Vertical Bar (R , G , B) Horizontal Bar (R , G , B) External Defect etc	
Module Model	PDP42V51330		Detail :			
Module Serial No.	312K142V5009368					
Country	Netherlands	PCB B/D defect only Serial No.	X-L-TOP(UP) X-L-BTM(LOW) Y-SUS Z-SUS	X-C-TOP X-C-BTM Y-DRV-TOP etc	X-R-TOP X-R-BTM Y-DRV-BTM	PSU DC-DC CTRL
Customer purchase date	2004 / 04 / 05		No.: the last line number of white label on B/D			
Issued date	2004 / 04 / 30					
Issued place	Office or living room	COF defect only Serial No.	Ex) Long 2-4 IC Fail or Resistor Fail			
Condition in use	Use as monitor		No.: the number of white label on inside COF			
Detailed repair records and the result including date	Replace Control Board (2004 / 04 / 06) : Not improved					
Pictures of Symptom						

White label